START ENGINEERING CHANGE NOTICE

0035792

Page 1 of 11

1. ECN 105409

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. Date
Supplemental [X] Direct Revision [ ] Change ECN [ ] Temporary [ ] Supersedure [ ] Discovery [ ] Cancel/Void [ ]	EE Borders/PUREX Systems & Technology/S6-01/3-4202	August 10, 1989
	5. Project Title/No./Work Order No. W-012 and W-013	6. Bldg./Sys./Fac. No. 202-A
	8. Document Number Affected (include rev. and sheet no.) SD-HS-SAR-001 REV 5	9. Related ECN No(s). N/A
		7. Impact Level 2
		10. Related PO No. N/A

11a. Modification Work	11b. Work Package Doc. No.	11c. Complete Installation Work	11d. Complete Restoration (Temp. ECN only)
[ ] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	N/A	N/A Cog. Engineer Signature & Date	N/A Cog. Engineer Signature & Date

12. Description of Change

Add a new section, 5.3.5, "Contaminated Sodium Hydroxide Storage and Distribution," and add a paragraph to subsection 5.3.3.3, "Description of PUREX Chemicals," under the bullet, "Sodium Hydroxide (NaOH)," of Chapter 5.

Change Table of Contents, p5-iii, Section 5.3, "Support Systems," by adding subsection "5.3.5, "Contaminated Sodium Hydroxide Storage and Distribution."

Add a paragraph to subsection 6.5.4.3, "50 wt % Caustic," and Figure 6-76a, "Contaminated Sodium Hydroxide System," in Chapter 6.

Change figure list on p 6-B, Section 6.0, "Process System," by adding Figure 76a, "Contaminated Sodium Hydroxide System."

Change Table of Contents, p 6.vi, Section 6.0, "Process Systems," by adding Table 31-a, Radioactive Contaminant Concentrations in Sodium Hydroxide."

Add new paragraph to subsection 5.4.1.2.1, "Flow," under bullet, Branch 1 following paragraph one on page 5-107: "The process vessels, i.e., transfer tanks, storage tanks, and truck tank are connected to a two in. ventilation header. The ventilation header is connected to the sample exhaust duct located in the sample gallery. The gaseous effluents are HEPA filtered prior to being released to the sample exhaust duct. The HEPA filter is diocryl phthalate (DOP) testable and is replaced if the filter plugs."

(continued on page 3)

13a. Justification (mark one)	13b. Justification Details
Criteria Change [ ] Design Improvement [X] Environmental [ ] As-Found [ ] Facilitate Const. [ ] Const. Error/Omission [ ] Design Error/Omission [ ]	A description of the storage facility and distribution system for the slightly contaminated sodium hydroxide in SD-HS-SAR-001, Rev 5, is required prior to the operation of the system facilities constructed under Projects W-012 and W-013.

14. Distribution (include name, MSIN, and number of copies)

See attached Distribution.

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BY

DATE SEP 11 1989

Sta # 1

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1)
105409

15. Design Verification Required	16. Cost Impact		17. Schedule Impact (days)
	ENGINEERING	CONSTRUCTION	
☐ Yes	Additional ☐ $ N/A	Additional ☐ $ N/A	Improvement ☐ N/A
☒ No	Savings ☐ $ N/A	Savings ☐ $ N/A	Delay ☐ N/A

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	☐	Seismic/Stress Analysis	☐	Tank Calibration Manual	☐
Functional Design Criteria	☐	Stress/Design Report	☐	Health Physics Procedure	☐
Operating Specification	☐	Interface Control Drawing	☐	Spares Multiple Unit Listing	☐
Criticality Specification	☐	Calibration Procedure	☐	Test Procedures/Specification	☐
Conceptual Design Report	☐	Installation Procedure	☐	Component Index	☐
Equipment Spec.	☐	Maintenance Procedure	☐	ASME Coded Item	☐
Const. Spec.	☐	Engineering Procedure	☐	Human Factor Consideration	☐
Procurement Spec.	☐	Operating Instruction	☐	Computer Software	☐
Vendor Information	☐	Operating Procedure	☒	Electric Circuit Schedule	☐
OM Manual	☐	Operational Safety Requirement	☐	ICRS Procedure	☐
FSAR/SAR	☐	IEFD Drawing	☐	Process Control Manual/Plan	☐
Safety Equipment List	☐	Cell Arrangement Drawing	☐	Process Flow Chart	☐
Radiation Work Permit	☐	Essential Material Specification	☐	Purchase Requisition	☐
Environmental Impact Statement	☐	Fac. Proc. Samp. Schedule	☐	_____	☐
Environmental Report	☐	Inspection Plan	☐	_____	☐
Environmental Permit	☐	Inventory Adjustment Request	☐	_____	☐

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number/Revision
PO-180-060		
PO-230-023		
PO-320-009		

20. Approvals

	Signature	Date		Signature	Date
OPERATIONS AND ENGINEERING			ARCHITECT-ENGINEER		
Cog./Project Engineer	EE Borders E.E. Borders	8-9-89	PE		
Cog./Project Engr. Mgr.	RJ Thompson RJ Thompson	8/9/89	QA		
QA	ST Smith C a Colevin for	8/16/89	Safety		
Safety	RW Szempruch G.L. Stricklan	8/14/89	Design		
Security			Other		
Proj.Prog./Dept. Mgr.					
Def. React. Div.					
Chem. Proc. Div.					
Def. Wst. Mgmt. Div.			DEPARTMENT OF ENERGY		
Adv. React. Dev. Div.					
Proj. Dept.	TL Yount T.L. Yount	9/7/89			
Environ. Div.	RL Landon Roger Landon B.J. Garrett	8/22/89 8/29/89	ADDITIONAL		
IRM Dept.					
Facility Rep. (Ops)	MB Enghusen MB Enghusen	8/15/89			
Other					

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hange Figure 5-28, page 5-103, which shows ventilation header tie-in to the east end of the sample exhaust duct located in the Sample Gallery.

Add Figure 5-21a, "Civil Site Plan."

Change Table of Contents of Chapter 5 by adding Figure 5-21a to page 5-iv.

5.3.5 Contaminated Sodium Hydroxide Storage and Distribution System

Slightly radioactive contaminated 50% sodium hydroxide (see Table 6-31a) is used to neutralize cladding removal waste (CRW), zirflex acid waste (ZAW), and other acid waste prior to transfer to underground storage tanks. Separate storage tanks, distribution piping, transfer tanks and pumps are used for this solution to prevent contamination of the primary sodium hydroxide storage and distribution system. The contaminated sodium hydroxide storage facility and distribution system includes the following systems and components:

- o Storage tanks (four 20,000 gallon units)
- o Storage tank sump
- o Truck load-in station
- o Heating system for storage tanks and outside transfer piping
- o Piping, valves, and pumps
- o Instrumentation and control systems
- o Transfer tanks (three 350 gallon units)
- o Service building.

The Storage Facility, consisting of four 20,000 gallon mild carbon steel tanks, truck load-in station, and a service building is located about 300 ft north of the 202-A Building. A civol site plan, Figure 5-21a, shows the location of the four storage tanks and the storage tank service building. The storage tanks are sited on a concrete foundation and include a concrete spill containment structure designed to contain normal precipitation and 110% capacity of one storage tank. The floor of the storage facility is sloped to a trench and drains into a sump for collection. Transfer options for sodium hydroxide spillage, normal precipitation, and washdown water collected in the sump are as follows:

1. Storage tanks (TK-22-25).
2. Transfer tanks located in the 202-A Sample Gallery (TK-26-28).
3. Sampling station located in the Service Building (215A).

The storage tanks are valved so that a single tank failure will not empty the three remaining tanks. These tanks are electrically heated and insulated since 50% NaOH solidifies below 50^{0}F. When the storage tank temperature drops below the setpoint, the tank heater will be turned on. If the tank level is low, the low temperature alarm will not be activated and the heater will not operate.

The truck load-in station is located south of and adjacent to the storage tanks. The load-in pad is a concrete structure with 6 in. high curbing on the north and south sides. An asphalt approach with a speed bump is provided on the west side to keep water run-off from entering the load-in station. The pad is sloped from the east and west directions toward a centrally located drain and drains to a storage tank sump for collection of tank spillage and washdown water. The sump contains a level-activated pump and transfers spillage/washdown solutions to a storage tank in the event of a tank truck spillage. Quick disconnect, non-leak type connectors and flexible hoses are provided to off-load the sodium hydroxide solution from the tank truck.

The sodium hydroxide distribution piping is configured to perform the following functions:

- o Off-load the tank truck
- o Recirculate the contents of the storage tanks
- o Transfer the contents of the storage tanks and sump to the 202-A Sample Gallery transfer tanks
- o Off-load the tank truck directly to the transfer tanks in the Sample Gallery
- o Transfer the contents of the sump or storage tanks to the tank truck or to temporary storage containers.

Stainless steel piping (ASTM A-312, Grade TP, 304L, seamless) designed and fabricated to ANSI 31.3 is used for the sodium hydroxide for the in-plant distribution system. Stainless steel was selected since exterior corrosion by nitric acid fumes of carbon steel piping in the Sample Gallery is a problem. The Storage Facility piping (outside) is mild carbon steel and is heat traced and insulated since sodium hydroxide, 50% solution solidifies at 50^{o}F.

Raw water flushing is provided for the distribution piping, storage tanks, transfer tanks, and for washdown of the load-in station. A backflow preventer is installed in the raw water supply to prevent contamination of the raw water source. In addition, steam flushing of the storage tank piping is provided to remove any solids buildup.

The connection of the piping from the Storage Facility (outside) to the transfer tanks located in the 202-A Sample Gallery and subsequently to tanks E-5, F-16, and F-18 in the process canyon consists of the following routing.

The P&O Gallery wall and the 202-A Sample Gallery ceiling were core drilled to permit access to the three 350 gallon mild carbon steel transfer tanks. From the transfer tanks the sodium hydroxide piping extends east and west in the Sample Gallery, penetrates the P&O Gallery floor, and then runs to the three acid neutralization tanks located in the canyon. All core drilling penetrations are

grouted to prevent radioactive material leakage from areas of higher levels of contamination to areas of lower levels of contamination.

Check valves are installed between the sodium hydroxide header 7006 and the selector valves to prevent feedback of slightly radioactive sodium hydroxide into the primary sodium hydroxide distribution header. The selector switch is located in the Head-End Control Room. Position 1 of the selector switch allows sodium hydroxide transfer from tanks 26, 27, and 28 to tanks F-16 and F-18. Position 2 provides transfer from tanks 26, 27, and 28 to tank E-5. Position 3 provides transfer from sodium hydroxide header 7006 to tank E-5. The transfer pump is manually started from the P&O Gallery or the 202-A Sample Gallery.

Tank truck off-loading and other transfer/recirculation functions are accomplished by using a centrifugal pump and manually operated valves located in the Service Building. The pump is interlocked with liquid level detectors located in the storage tank sump and the transfer tank containment sump. Also, a high liquid level interlock is provided for the storage and transfer tanks to prevent operation of the pump when they are filled with sodium hydroxide A manual override of the interlock is provided in the Storage Facility service building to allow the transfer of an over filled tank to another tank to alleviate the potential for spillage.

Control instrumentation and process monitoring functions are located in the Dispatcher's office, P&O Gallery, Sample Gallery, Storage Service Building, and the Head-end Control Room. The Dispatcher's Office trouble alarm functions under the following conditions:

- o High liquid levels in the transfer and storage tanks
- o Liquid detection in the transfer and storage tank sumps.

Located within the Storage Service Building is the instrumentation and controls for unloading the tank truck, transfer of sodium hydroxide to the storage and transfer tanks, and sampling and temperature control of the tanks and exterior piping. In addition, a by-pass switch is provided to activate the pump to transfer sodium hydroxide from any of the storage or transfer tanks if they are over filled.

The sodium hydroxide ventilation header and ventilation piping of the storage and transfer tanks and transfer truck are fabricated from ASTM A-312, Trade TP, 304L seamless stainless steel. The vent header is HEPA filtered prior to discharge to the east end of the 202-A Sample Gallery sample exhaust duct ventilation system. The 202-A Sample Gallery duct is serviced by Ventilation System 2 and the clouded area of Figure 5-28 shows the radioactive sodium hydroxide ventilation header tie-in to the east end of the 202-A Sample Gallery exhaust. The additional effluent flow to the sample exhaust ventilation system from the sodium hydroxide process vessels is only 0.30% of the available east end 202-A Sample Gallery exhaust and therefore and does not affect the performance of the 202-A Sample Gallery ventilation system.

5.3.3.3.3 Description of PUREX Chemicals.

o Sodium Hydroxide, NaOH

Sodium hydroxide is extremely caustic and may cause severe and, even fatal, burns. Hot caustic will cause almost instant destruction of body tissue. All forms, even solutions as dilute as 1%, can produce serious injury on contact. The dusts or mists of solutions, even in dilute quantities, are irritating to the respiratory organs. These concentrations that might damage the lungs should not be inhaled. Sodium hydroxide is received at the PUREX Plant in railroad tank car lots of 50 wt % solution and stored in the 211-A area, TK-20.

Slightly radioactive contaminated sodium hydroxide (see Table 6-31a) is received by tank truck, stored in storage tanks TK-22, -23, -24, and -25. Also, transfer tanks TK-26, -27, and -28, located in the 202-A Sample Gallery, are used as a sodium hydroxide source for neutralizing CRW, ZAW, and acid waste.

6.5.4.3 50 wt % Caustic. There are two types of sodium hydroxide available for use in the plant, i.e., uncontaminated and slightly radioactive contaminated. The slightly radioactive contaminated source is from primary coolant sodium from terminated reactor programs that was converted to sodium hydroxide at the Idaho National Engineering Laboratory (INEL). The radioactive contaminant concentrations in the sodium hydroxide are shown in Table 6-31a.

Table 6-31.a. Radioactive Contaminant Concentrations in Sodium Hydroxide

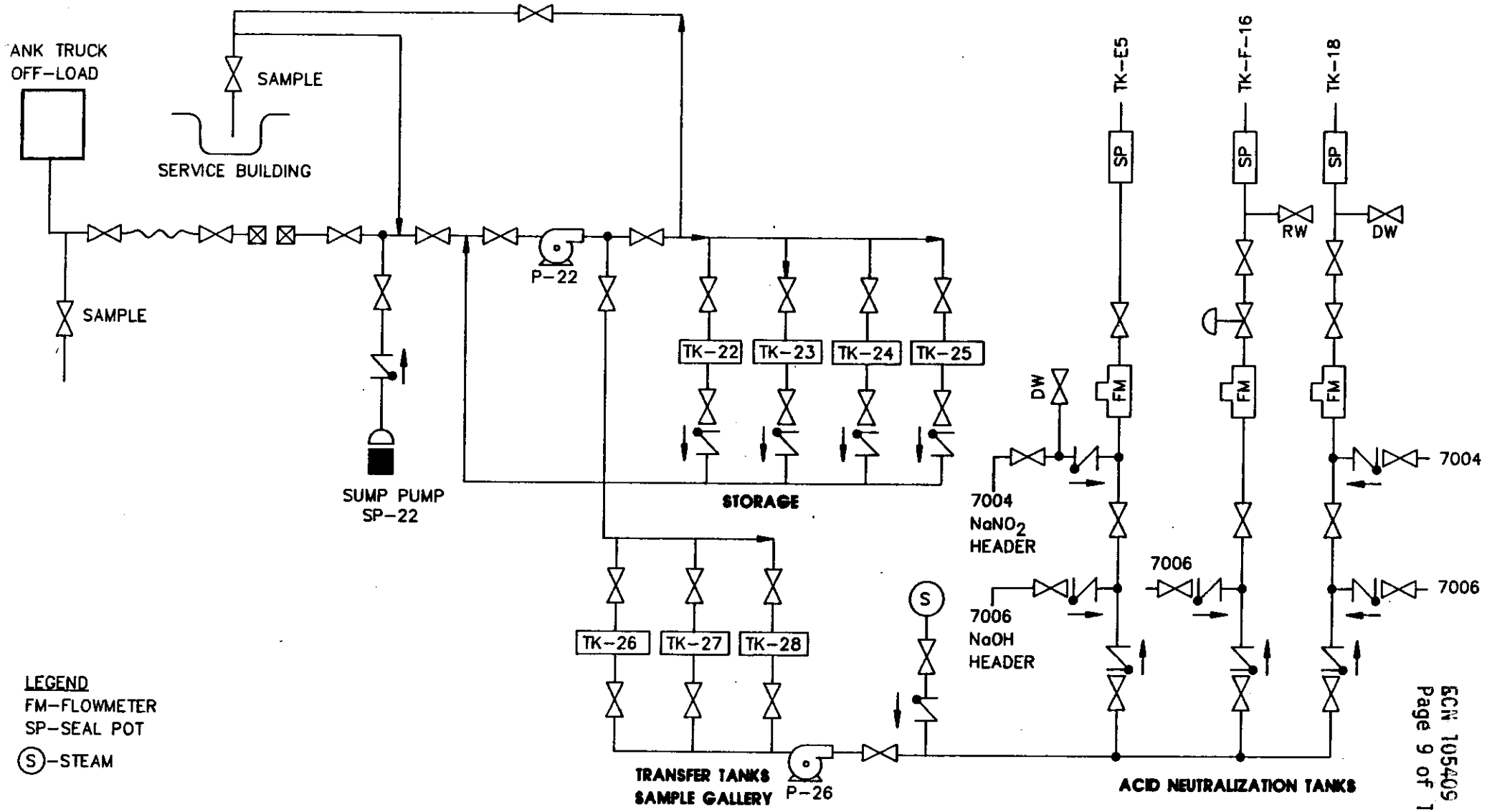
Isotope	Contaminant Concentrations* (uCi/ml) Fermi-1	Hallam	SRE
Na-22	3.61×10^{-1}		1.50×10^{-2}
Sr-90	1.67×10^{-1}		
Mn-54		2.56×10^{-8}	
Co-60		6.17×10^{-6}	
Zn-65		1.10×10^{-9}	
Ru-106		4.85×10^{-9}	
Rh-106		4.85×10^{-8}	
Cs-134		3.88×10^{-7}	
Cs-137	3.35×10^{-1}	3.88×10^{-4}	5.85×10^{-1}
Ba-137m	3.35×10^{-1}	3.66×10^{-4}	5.53×10^{-1}

*Contaminant concentrations are listed to 50 wt% sodium hydroxide produced from metallic sodium used at Fermi-1, Hallam, and the Sodium Reactor Experiment (SRE).

The uncontaminated sodium hydroxide is received by railroad tank car and is stored in 211-A tanks. The distribution system shown in Figure 6-76, services the process systems and the AMU area. The primary use is to neutralize acid waste streams. The availability of the slightly radioactive sodium hydroxide for acid waste neutralization will reduce the consumption of uncontaminated sodium hydroxide.

The slightly radioactive sodium hydroxide system consists of a storage tank, load-in station, and distribution system. The sodium hydroxide is received in 4,000 gallon quantities using tank trucks from INEL and is off-loaded to the storage tanks for use in the neutralization of CRW, ZAW, and other acid wastes. The distribution system shown in Figure 6-67a services canyon tanks E5, F16 and F18.

FIGURE 6-76a CONTAMINATED SODUIM HYDROXIDE SYSTEM



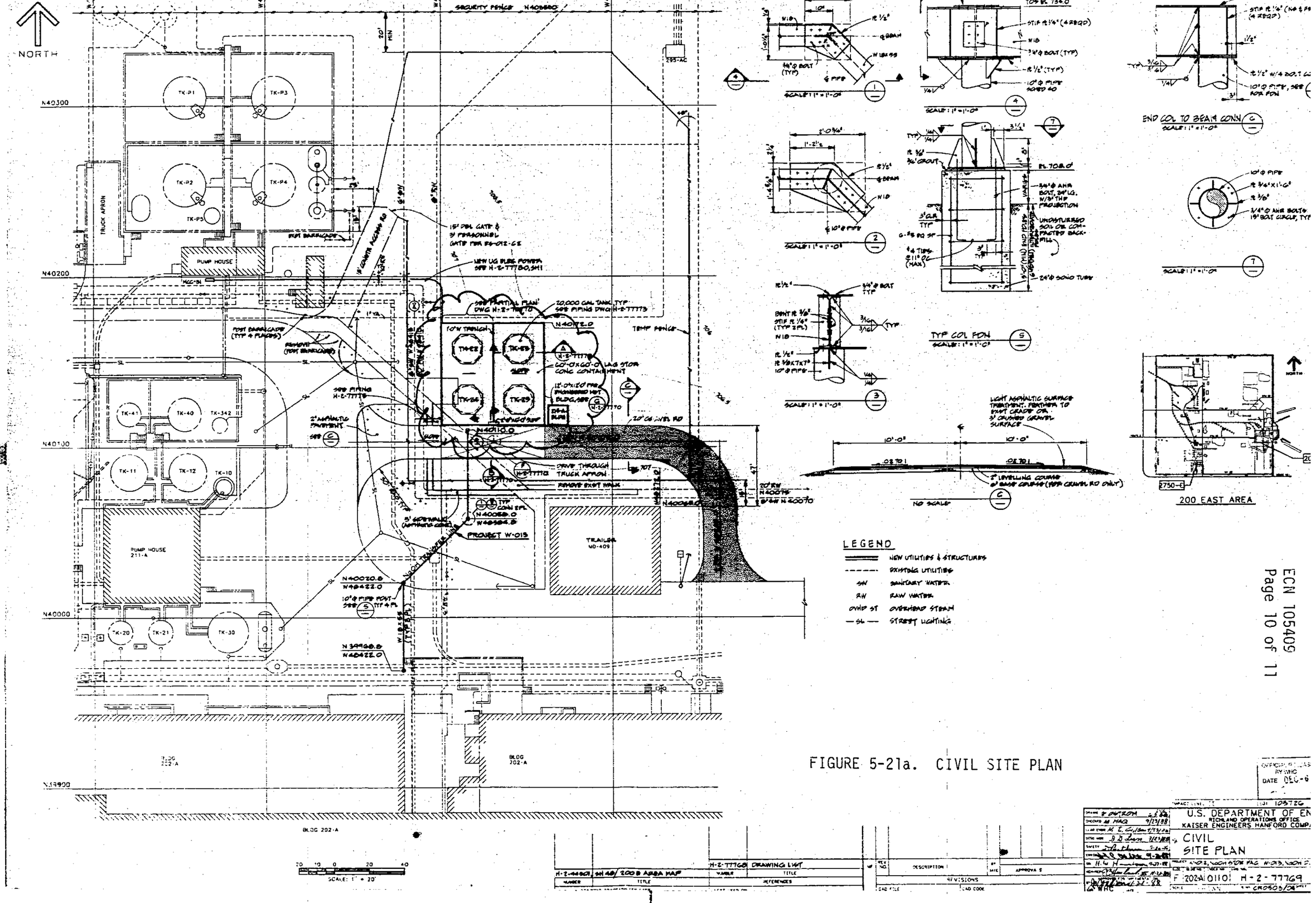
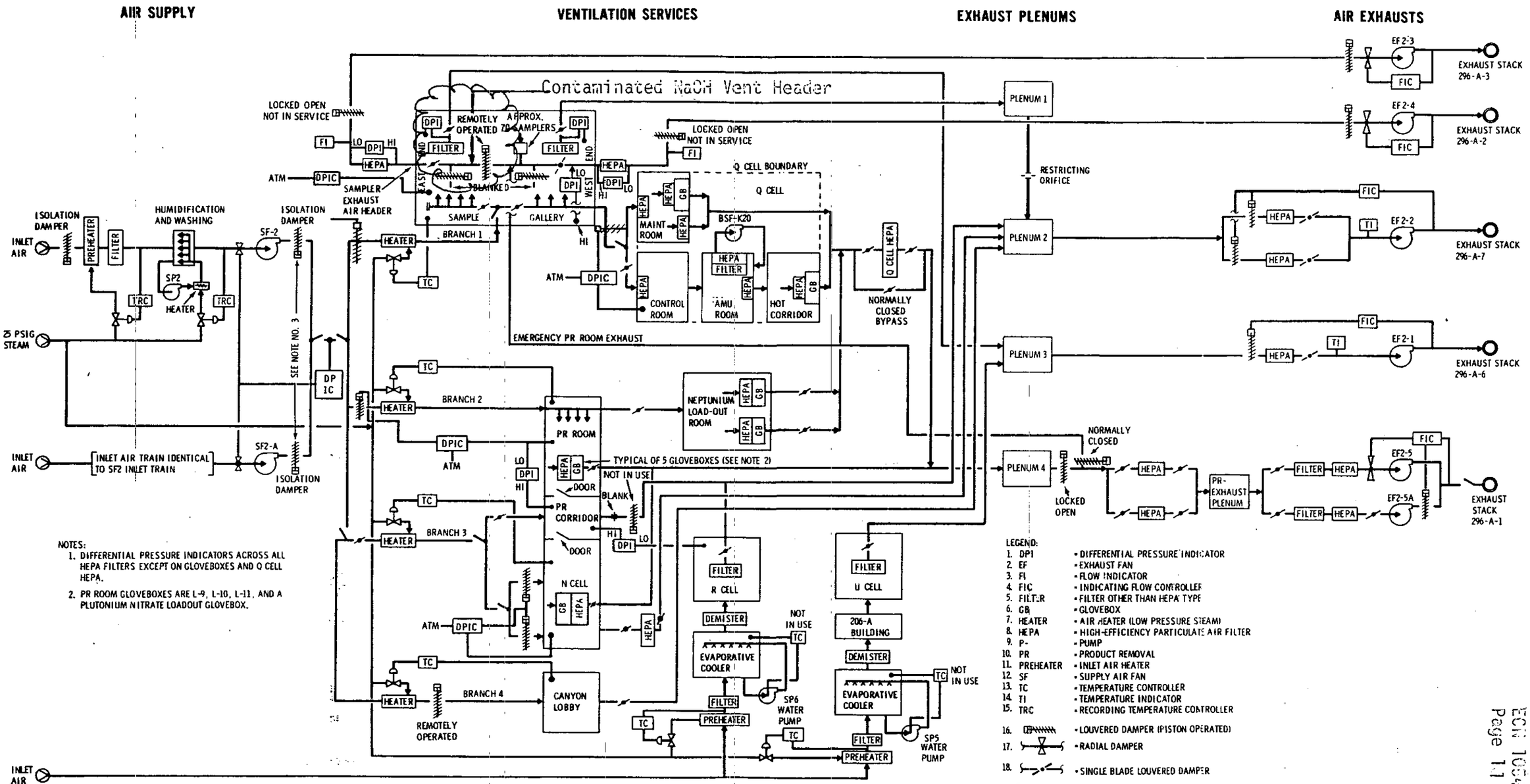


FIGURE 5-21a. CIVIL SITE PLAN

U.S. DEPARTMENT OF EN
RICHLAND OPERATIONS OFFICE
KAISER ENGINEERS HANFORD COMP.
CIVIL
SITE PLAN
H-2-77769
H-2-77760 DRAWING LIST
H-2-44907 SH 40 200 E AREA MAP



NOTES:
1. DIFFERENTIAL PRESSURE INDICATORS ACROSS ALL HEPA FILTERS EXCEPT ON GLOVEBOXES AND Q CELL HEPA.
2. PR ROOM GLOVEBOXES ARE L-9, L-10, L-11, AND A PLUTONIUM NITRATE LOADOUT GLOVEBOX.

LEGEND:
1. DPI - DIFFERENTIAL PRESSURE INDICATOR
2. EF - EXHAUST FAN
3. FI - FLOW INDICATOR
4. FIC - INDICATING FLOW CONTROLLER
5. FILTER - FILTER OTHER THAN HEPA TYPE
6. GB - GLOVEBOX
7. HEATER - AIR HEATER (LOW PRESSURE STEAM)
8. HEPA - HIGH-EFFICIENCY PARTICULATE AIR FILTER
9. P- - PUMP
10. PR - PRODUCT REMOVAL
11. PREHEATER - INLET AIR HEATER
12. SF - SUPPLY AIR FAN
13. TC - TEMPERATURE CONTROLLER
14. TI - TEMPERATURE INDICATOR
15. TRC - RECORDING TEMPERATURE CONTROLLER
16. - LOUVERED DAMPER (PISTON OPERATED)
17. - RADIAL DAMPER
18. - SINGLE BLADE LOUVERED DAMPER
19. - SPLITER DAMPER

RCP7906-1388

FIGURE 5-28. Flow Diagram--Ventilation System 2.

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To

From

PUREX Systems & Technology

Date August 10, 1989

Project Title/Work Order

CONTAMINATED SODIUM HYDROXIDE STORAGE AND DISTRIBUTION SYSTEM

EDT No.

ECN No 105409

Name	MSIN	With Attach.	EDT/ECN & Comment	EDT/ECN Only
D. K. Bailey	S6-08	X		
G. F. Boothe	R3-20	X		
E. E. Borders	S6-01	X		
C. L. Brown	T5-50	X		
R. C. Brown	R3-20	X		
F. T. Calapristi	H4-52	X		
R. Dessaules	A4-25	X		
G. T. Dukelow	R1-81	X		
J. T. Durnil	T5-15	X		
J. H. Ellis	S5-66	X		
B. Enghusen	S5-80	X		
R. A. Eschenbaum	S5-66	X		
R. D. Fox	S5-80	X		
D. G. Harlow	R2-01	X		
W. M. Harty	S5-80	X		
D. C. Hedengren	S6-01	X		
M. E. Hevland	R3-12	X		
P. F. Kison	S5-66	X		
J. R. Knight	R2-52	X		
E. J. Kosiancic	R2-15	X		
R. A. Kulick	S6-05	X		
R. J. Landon	H4-50	X		
G. J. LeBaron	S5-80	X		
E. E. Leitz	R3-02	X		
W. E. Matheison	S5-80	X		
M. Nielson	A4-25	X		
G. C. Owens	L6-59	X		
D. K. Oestreich	R3-02	X		

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To	From	Page 2 of 2
	PUREX Systems & Technology	Date August 10, 1989
Project Title/Work Order CONTAMINATED SODIUM HYDROXIDE STORAGE AND DISTRIBUTION SYSTEM		EDT No.
		ECN No 105409

Name	MSIN	With Attach.	EDT/ECN & Comment	EDT/ECN Only
M. A. Payne	S5-66	X		
P. D. Rittman	N1-31	X		
E. D. Robbins	S6-70	X		
D. H. Shuford	S6-02	X		
S. T. Smith	S1-53	X		
G. C. Strickland	S6-05	X		
R. W. Szempruch	S6-05	X		
R. J. Thompson	S6-01	X		
R. E. Van der Cook	S6-07	X		
R. L. Walser	S5-80	X		
N. Sutton	R2-58	X		
R. H. Guyman	H4-50	X		
N. C. Boyter	R2-52	X		
L. P. Diediker	T1-30	X		
S. D. Godfrey	S5-80	X		